IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of
SCOTT, et al
Serial No. 10/589,075
Filed: August 11, 2006
For: SURFACE SHAPE MEASUREMENT APPARATUS AND METHOD

Confirmation No.: 5828
Atty. Ref.: 124-1166
Group: 2886
Examiner: M. LaPage

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APPEAL BRIEF

On Appeal From Group Art Unit 2886

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August 18, 2010

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

I. REAL PARTY IN INTEREST

The real party in interest in the above-identified appeal is QinetiQ Limited by virtue of an assignment of rights from the inventors to QinetiQ Limited recorded August 11, 2006 at Reel 18191, Frame 757.

II. RELATED APPEALS AND INTERFERENCES

There are believed to be no related appeals, interferences or judicial proceedings with respect to the present application, other than the Pre-Appeal Brief Request for Review previously filed in this appeal on March 13, 2009,

whereby prosecution was reopened on April 13, 2009 by the Pre-Appeal Panel, and a subsequent Pre-Appeal Brief Request for Review filed on April 15, 2010.

III. STATUS OF CLAIMS

Claims 4, 17, 18, 22 and 23 have been cancelled without prejudice during prosecution. Claims 1, 2, 5-7, 11-16, 19-21 and 24 stand rejected in the Final Official Action under 35 USC §103 as being obvious over the Kanoh (U.S. Patent 4,643,576)/Devie (U.S. Pub. 2003/0112426)/Almogy (U.S. Pub. 2003/0058433) combination of references. Claims 3 and 10 stand rejected under 35 USC §103 as unpatentable over the Kanoh/Devie/Almogy/Kuchel (although not identified in the Final Rejection, this is presumably a reference to U.S. Pub. 2003/0128368 previously cited during prosecution) combination. Claims 8 and 9 stand rejected under 35 USC §103 over the Kanoh/Devie/Almogy/Burge (U.S. Patent 5,737,079) combination. The above rejections of claims 1-3, 5-16, 19-21 and 24 are appealed.

IV. STATUS OF AMENDMENTS

No further response has been submitted with respect to the Final Official Action in this application other than the filing of a second Pre-Appeal Brief Request for Review which Panel decision was mailed June 18, 2010 (Paper No. 20100615).

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Appellants' specification and figures provide an explanation of the claimed invention set out in independent claims 1, 19 and 24, with each claimed structure and method step addressed as to its location in the specification and in the figures.

"1. Apparatus for indicating the departure of a shape of an object [embodiment of Figure 1, planar object 3 as discussed on page 11, line 28 to page 12, line 13, embodiment of Figure 2, lens 11 as discussed on page 12, line 28 to page 13, line 15, embodiment of Figure 3, wafer 16 as discussed on page 13, lines 16-22, embodiment of Figure 4, curved reflector 18 as discussed on page 13, lines 23-29, embodiment of Figure 5, complex lens 22 as discussed on page 14, lines 1-12, embodiment of Figure 6, curved reflector 26 as discussed on page 14, lines 13-22 and embodiment of Figure 7, mirror 18 as discussed on page 14, line 23 to page 15, line 7 and elsewhere in the specification] from a specified shape, the apparatus comprising:

radiation means for directing an incident beam of radiation onto the object [embodiments of Figures 1-7, light source 1 and beam 4 as discussed on page 11, line 28 to page 12, line 3 and elsewhere in the specification],

inspecting means for inspecting a final beam, said object located optically between said radiation means and said inspecting means [embodiments of Figures

1-7, inspecting means 5 as discussed on page 11, line 28 to page 12, line 3 and elsewhere in the specification],

at least one wavefront shaping means, optically disposed between the radiation means and the inspecting means, for shaping the final beam to have a substantially planar wavefront when said object has said specified shape [embodiment 1, lens 2 as shown in Figure 1 and discussed on page 11, line 28 to page 12, line 27, embodiment of Figure 2, lens 10 as discussed on page 12, line 28 to page 13, line 15, embodiment of Figure 3, polarizer 13, beamsplitter 14 and ¼ wave plate 15 as discussed on page 13, lines 16-22, embodiment of Figure 4, lens 17 as discussed on page 13, lines 23-29, embodiment of Figure 5, modulator 19 and lens 20 as discussed on page 14, lines 1-12, embodiment of Figure 6, modulator 19 and lens 24 as discussed on page 14, lines 13-22 and embodiment of Figure 7, the variable position of mirrors 18' and 18" as discussed on page 14, line 23 to page 15, line 7 and elsewhere in the specification], and said final beam comprises a beam which has been both transmitted by or reflected from said object and shaped by said wavefront shaping means, said at least one wavefront shaping means is arranged to compensate for non-planarity introduced by said object having said specified shape, and said inspecting means is arranged to determine any departure of the wavefront of the final beam from planarity, wherein said inspecting means comprises:

beamsplitting means for splitting the final beam into two or more beams and for directing said two or more beams to laterally displaced locations [embodiments of Figures 1-7, beamsplitter 6 as discussed on page 11, lines 8-21, page 2, line 15, page 3, line 18, page 8, line 1 and elsewhere in the specification]; and

detector means for detecting radiation intensity of said two or more beams on the detector means [embodiments of Figures 1-7, CCD camera 8 as discussed on page 11, lines 5-21, page 7, lines 12-20 and elsewhere in the specification]."

"19. A method of indicating the departure of a shape of an object [embodiment of Figure 1, planar object 3 as discussed on page 11, line 28 to page 12, line 13, embodiment of Figure 2, lens 11 as discussed on page 12, line 28 to page 13, line 15, embodiment of Figure 3, wafer 16 as discussed on page 13, lines 16-22, embodiment of Figure 4, curved reflector 18 as discussed on page 13, lines 23-29, embodiment of Figure 5, complex lens 22 as discussed on page 14, lines 1-12, embodiment of Figure 6, curved reflector 26 as discussed on page 14, lines 13-22 and embodiment of Figure 7, mirror 18 as discussed on page 14, line 23 to page 15, line 7 and elsewhere in the specification] from a specified shape, the method including the steps of:

directing an incident beam of radiation onto the object [embodiments of Figures 1-7, light source 1 and beam 4 as discussed on page 11, line 28 to page 12, line 3 and elsewhere in the specification];

shaping at least one of said incident beam and a beam transmitted by or reflected from said object to have a planar wavefront if the object has said specified shape, a final beam comprising a beam which has been both transmitted by or reflected from said object and shaped by said shaping step [embodiment 1, lens 2 as shown in Figure 1 and discussed on page 11, line 28 to page 12, line 27, embodiment of Figure 2, lens 10 as discussed on page 12, line 28 to page 13, line 15, embodiment of Figure 3, polarizer 13, beamsplitter 14 and ¼ wave plate 15 as discussed on page 13, lines 16-22, embodiment of Figure 4, lens 17 as discussed on page 13, lines 23-29, embodiment of Figure 5, modulator 19 and lens 20 as discussed on page 14, lines 1-12, embodiment of Figure 6, modulator 19 and lens 24 as discussed on page 14, lines 13-22 and embodiment of Figure 7, the variable position of mirrors 18' and 18" as discussed on page 14, line 23 to page 15, line 7 and elsewhere in the specification]; and

inspecting the final beam for any departure of its wavefront from planarity [embodiments of Figures 1-7, the function of inspecting means 5 as discussed on page 11, line 28 to page 12, line 3 and elsewhere in the specification], wherein the step of inspecting said final beam comprises the steps of:

splitting the final beam into two or more beams [embodiments of Figures 1-7, beamsplitter 6 as discussed on page 11, lines 8-21, page 2, line 15, page 3, line 18, page 8, line 1 and elsewhere in the specification]; and

directing said two or more beams to laterally displaced locations on a detector [embodiments of Figures 1-7, CCD camera 8 as discussed on page 11, lines 5-21, page 7, lines 12-20 and elsewhere in the specification]."

"24. Apparatus for indicating the departure of a shape of an object [embodiment of Figure 1, planar object 3 as discussed on page 11, line 28 to page 12, line 13, embodiment of Figure 2, lens 11 as discussed on page 12, line 28 to page 13, line 15, embodiment of Figure 3, wafer 16 as discussed on page 13, lines 16-22, embodiment of Figure 4, curved reflector 18 as discussed on page 13, lines 23-29, embodiment of Figure 5, complex lens 22 as discussed on page 14, lines 1-12, embodiment of Figure 6, curved reflector 26 as discussed on page 14, lines 13-22 and embodiment of Figure 7, mirror 18 as discussed on page 14, line 23 to page 15, line 7 and elsewhere in the specification] from a specified shape, the apparatus comprising:

a radiation source [embodiments of Figures 1-7, light source 1 and beam 4 as discussed on page 11, line 28 to page 12, line 3 and elsewhere in the specification] for directing an incident beam of radiation onto the object;

a beam inspecting device [embodiments of Figures 1-7, inspecting means 5 as discussed on page 11, line 28 to page 12, line 3 and elsewhere in the specification] for inspecting a final beam, wherein said final beam comprises a beam which has been both transmitted by or reflected from said object and shaped by at least one wavefront shaping device, said object located optically between said radiation source and said inspecting device;

said at least one wavefront shaping device [embodiment 1, lens 2 as shown in Figure 1 and discussed on page 11, line 28 to page 12, line 27, embodiment of Figure 2, lens 10 as discussed on page 12, line 28 to page 13, line 15, embodiment of Figure 3, polarizer 13, beamsplitter 14 and ¼ wave plate 15 as discussed on page 13, lines 16-22, embodiment of Figure 4, lens 17 as discussed on page 13, lines 23-29, embodiment of Figure 5, modulator 19 and lens 20 as discussed on page 14, lines 1-12, embodiment of Figure 6, modulator 19 and lens 24 as discussed on page 14, lines 13-22 and embodiment of Figure 7, the variable position of mirrors 18' and 18" as discussed on page 14, line 23 to page 15, line 7 and elsewhere in the specification], optically disposed between the radiation source and the inspecting device, for shaping the final beam to have a substantially planar wavefront when said object has said specified shape, said at least one wavefront shaping device is arranged to compensate for non-planarity introduced by said object having said specified shape, and said inspecting device is arranged

to determine any departure of the wavefront of the final beam from planarity, wherein said inspecting device comprises:

a diffraction device [embodiments of Figures 1-7, beamsplitter 6 as discussed on page 11, lines 8-21, page 2, line 15, page 3, line 18, page 8, line 1 and elsewhere in the specification] for splitting the final beam into two or more beams and for directing said two or more beams to laterally displaced locations; and

a photosensor [embodiments of Figures 1-7, CCD camera 8 as discussed on page 11, lines 5-21, page 7, lines 12-20 and elsewhere in the specification] for detecting radiation intensity of said two or more beams at said laterally displaced locations."

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, 2, 5-7, 11-16, 19-21 and 24 stand rejected under 35 USC §103 as unpatentable over the Kanoh (U.S. Patent 4,643,576) in view of Devie (U.S. Pub. 2003/0112426) in view of Almogy (U.S. Pub. 2003/0058433).

Claims 3 and 10 stand rejected under 35 USC §103 as unpatentable over the Kanoh/Devie/Almogy combination further in view of Kuchel (Kuchel is not identified in the Final Rejection, but is presumably U.S. Pub. 2003/0128368 cited in the Official Action mailed November 13, 2008).

Claims 8 and 9 stand rejected under 35 USC §103 as unpatentable over the Kanoh/Devie/Almogy combination further in view of Burge (U.S. Patent 5,737,079) combination.

VII. ARGUMENT

Appellants' arguments include the fact that the burden is on the Examiner to first and foremost properly construe the language of the claims to determine what structure and/or method steps are covered by that claim. After proper construction of the claim language, the burden is also on the Examiner to demonstrate where a single reference (in the case of anticipation) or a plurality of references (in the case of an obviousness rejection) teaches each of the structures and/or method steps recited in independent claims 1, 19 and 24.

The Court of Appeals for the Federal Circuit has held that "the PTO has the burden under Section 103 to establish a *prima facie* case of obviousness." *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). "It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

In its recent decision, the U.S. Supreme Court in *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (April 2007), held that it is often necessary for a court to look to interrelated teachings of multiple patents, the effects of demands

known to the design community or present in the marketplace and the background knowledge possessed by a person of ordinary skill in the art in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. The Supreme Court held that "[t]o facilitate review, **this analysis should be made explicit**." *Id.* at 1396 (emphasis added).

The Supreme Court in its *KSR* decision went on to say that it followed the Court of Appeals for the Federal Circuit's advice that "rejections on obviousness grounds **cannot be sustained by mere conclusory statements**; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness" (emphasis added, the Supreme Court quoting from the Court of Appeals for the Federal Circuit in *In re Kahn*, 78 USPQ2d 1329 (Fed. Cir. 2006)).

The Federal Circuit's holding in *Gurley* states that the "useful general rule" is that "a reference that 'teaches away' cannot serve to create a *prima facie* case of obviousness." (*In re Gurley*, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994)).

A. The Examiner fails to identify where Appellants' claimed "wavefront shaping means . . . for shaping the final beam to have a substantially planar wavefront when said object has said specified shape" is disclosed in any cited prior art reference

As is well known, 35 USC §112 (6th paragraph) requires that the Examiner construe the "wavefront shaping means" in the independent claims to cover the corresponding structure (or method steps) disclosed in the specification and equivalents thereof.

Appellants' specification discloses that the wavefront shaping means is "lens 2" as shown in Figure 1 and discussed on page 11, line 28 to page 12 line 27, a "lens of known properties (10)" as shown in Figure 2 and discussed on page 12, line 28 to page 13, line 15, the "polarizer 13" the "beamsplitter 14" and the "¼ wave plate 15" disclosed in Figure 3 and discussed on page 13, lines 16-22, the "lens of known properties (17)" disclosed in Figure 4 and discussed on page 13, lines 23-29, and the "spatial light modulator (19)" and the "lens 20" shown in Figure 5 and discussed on page 14, lines 1-12, and the "spatial light modulator (19)" and the "lens 224" shown in Figure 6 and discussed on page 14, lines 13-22, and the variable position of mirrors "18'" and "18"" as shown in Figure 7 and discussed on page 14, line 23 to page 15, line 7. There are corresponding disclosures in the specification of the details of the shaping function of the "means" and the step (in the method step 19).

All of the above structural components (and method steps) disclosed in Appellants' specification and their structural (step) equivalents are covered by the claim language and the language is limited to these structures (and steps) and their equivalents. These structures have the function of pre-shaping a wavefront that is incident on the object under test so as to compensate for any non-planarity of the beam transmitted by or reflected from the object. The pre-shaping is such that it compensates for any "non-planarity introduced by said object having said specified shape."

As a result of the wavefront shaping means, if the object has the specified shape, then the wavefront of the beam transmitted or reflected from the object will be planar. Accordingly, if the object does not have the specified shape (i.e., it is a "departure" from the specified shape), then the wavefront of the "final beam" will not be planar and the non-planarity of this "final beam" will indicate the "departure of a shape of an object from a specified shape" as claimed. This is described in detail on pages 4 and 5 and elsewhere in Appellants' specification.

While the Examiner suggests that Appellants' claimed "wavefront shaping means" is disclosed in Kanoh, this is respectfully traversed. The Examiner does not indicate that Kanoh contains any teaching of structures corresponding to the above structures which comprise Appellants' claimed "wavefront shaping means." Accordingly, even if Kanoh accomplished the same function, i.e., "shaping the final beam to have a substantially planar wavefront when said object has said specified

shape," Kanoh does not disclose the corresponding structures disclosed in Appellants' specification which the Examiner is obligated to construe "at least one wavefront shaping means" to cover (as required by 35 USC §112 (6th paragraph)).

Additionally, Appellants' independent claims 1 and 19 require that the "beamsplitting means" cooperate with the "at least one wavefront shaping means" to direct two or more beams to "laterally displaced locations." Kanoh teaches the opposite, i.e., that beams concurrently disclosed must create interference fringes (see Kanoh, column 3, lines 42-55). In fact, Kanoh states "in this sense, this interference process is a shearing interference process." Quite clearly, Kanoh does not disclose the claimed "wavefront shaping means" or the interrelationship between the final beam produced by the "wavefront shaping means" as modified by the claimed "beamsplitting means."

In view of the above admissions and disclosure and because Kanoh does not teach the claimed "wavefront shaping means," it cannot render obvious this claimed combination of structures (claims 1 and 24) or method steps (claim 19).

B. The Examiner fails to identify where Appellants' claimed "beamsplitting means for splitting the final beam into two or more beams and for directing said two or more beams to laterally displaced locations" is disclosed in any cited prior art reference

The definition of "beamsplitter means" must be construed under 35 USC §112 (6th paragraph) to cover the embodiments disclosed in Appellants' specification

and equivalents thereof. Accordingly, the disclosed structures in the specification corresponding to the beamsplitting means are for "splitting the final beam into two or more beams" and "for directing said two or more beams to laterally displaced locations." These structures are shown in Figures 1-7, as being the beamsplitter 6 as discussed on page 11, lines 8-21, page 2, line 15, page 3, line 18, page 8, line 1 and elsewhere.

What is meant by "laterally displaced locations" is discussed in detail on page 11, lines 8-21, page 13, lines 2-6, page 14, lines 25-28 and elsewhere in the specification. If the "laterally displaced spots" (which presumably correspond to the claimed "laterally displaced locations" of the "two or more beams") have spaces between them, i.e., they are displaced laterally, there can be no overlapping of the beams, which of course is required in order to create Kanoh's interference fringes. Thus, Appellants' "beamsplitting means" as properly construed under 35 USC §112(6th ¶) covers the "laterally displaced spots" disclosure in Appellants' specification and, since Kanoh has no "laterally displaced" beams or spots, Kanoh fails to teach this claimed subject matter.

However, the Examiner alleges that the claimed structure is shown in the Kanoh reference (see 4th non-final Official Action, page 3, 1st full paragraph). However, the cited portion of Kanoh at column 3, lines 30-51, does not contain any such teaching. As disclosed in Kanoh's Figure 1 and as stated clearly at column 3, lines 45-48, "on the photodetector 22, therefore, interference fringes are

produced . . . ." As is well known in the art, an interference fringe is a consequence of two beams overlapping on the detector. Those of ordinary skill in the art will clearly understand that if the beams are directed "to laterally displaced locations" they cannot overlap.

Moreover, those of ordinary skill in the field of optics will clearly understand that two overlapping beams which produce an interference fringe is different optically from the separated individual beams. Accordingly, "laterally displaced locations" is specifically recited claim language that distinguishes the Kanoh reference.

The Examiner's admits on page 4, 2nd full paragraph, that Kanoh and Devie "does not explicitly disclose where the beamsplitting means of said inspecting means comprises at least one of a diffraction grating and hologram." This admission is very much appreciated because this is the corresponding structure in Applicants' specification to which said "beamsplitting means" refers. The Examiner relies upon Almogy as purportedly disclosing the use of a diffraction grating.

It should be noted that Almogy does not have anything to do with "two or more beams" or laterally displaced locations of the "two or more beams" on a detector as required by Appellants' claims. Almogy simply splits one beam so as to shine on three separate detectors. Accordingly, he teaches away from the claimed detector means upon which two or more laterally displaced beams are directed. Importantly, Almogy does not disclose the "radiation means," the "inspecting

means" or the "at least one wavefront shaping means" as required by Appellants' independent claims 1, 19 and 24.

In view of the above admissions and disclosure, even if Kanoh, Devie and Almogy are combined, the claimed details of Appellants' "beamsplitting means" is not present and therefore any rejection under 35 USC §103 fails.

C. The Examiner fails to identify where Appellant's claimed "detector means for detecting radiation intensity of said two or more beams on the detector means" is disclosed in any cited prior art reference

Just as with the claimed "beamsplitting means," the claims' recitation of "detector means" must be construed in accordance with 35 USC §112 (6th paragraph) to cover the corresponding structure in Appellants' specification and equivalents thereof. The "detector means for detecting radiation intensity of said two or more beams on the detector means" is disclosed in all embodiments of Figures 1-7 as a CCD camera 8 discussed on page 11, lines 5-21, page 7, lines 12-20. Therefore, the claim to be properly construed, must cover the disclosed CCD camera and equivalents thereof.

The Examiner admits that "Kanoh does no [sic] explicitly disclose a detector means (i.e. a CCD detector)." (See page 3, 3rd full paragraph of the Final Rejection). This admission is very much appreciated. However, the Examiner suggests that the Devie reference does contain this missing disclosure in Figure 3.

Unfortunately, the Examiner misapprehends the subject matter of Devie at Figure 3.

Devie's Figure 3 discloses two completely separate point sources – one point source 40 for a plane wavefront and a second point source 52 for a spherical wavefront (described in Devie's paragraphs 65 and 66). Beams from these two respective point sources are ultimately focused on two separate detectors 50 and 56. Appellants' claimed "detector means" detects radiation from a final beam which has been split into "said two or more beams." There is no disclosure in Devie of beams from one point source being split into two separate beams and then those two separate beams are detected on a CCD camera or its structural equivalent.

There is simply no beamsplitting means disclosed in Devie for splitting a final beam into two or more beams and then directing those two or more beams to laterally displaced locations. While the Examiner may attempt to suggest that the microlens arrays 48 and 54 somehow create separate beams, they do not. The point sources 40 and 52 each generate a single beam and each of those single beams, after passing through the optical component, is reflected onto the microlens array. Two separate beams are not created from a single beam, except for one by each point source. The microlenses tend to focus the single beams at varying degrees of focus onto the CCD plane 50 or 56.

The Examiner does not allege that Almogy teaches Appellants' claimed "detector means for detecting radiation of said two or more beams" which have been split from "the final beam" in the beamsplitter means, on the detector means. Should the Examiner believe this is disclosed in Almogy, he is respectfully requested to detail such disclosure.

In view of the above admissions and disclosure, Appellants' claimed "detector means" as disclosed in Appellants' specification is not disclosed in any of the Kanoh/Devie/Almogy reference combination and therefore any further rejection under 35 USC §103 is respectfully traversed.

D. The Examiner fails to meet his burden of identifying evidence setting out a *prima facie* case of obviousness because the Kanoh/Devie/Almogy combination does not teach the claimed "wavefront shaping means," the "beamsplitting means" or the "detector means"

As noted above in argument sections A-C, the Examiner does not identify structure in the cited prior art references which actually discloses any of the properly construed "wavefront shaping means," "beamsplitting means" or "detector means." As noted above in *In re Fine*, the absence of any claimed structure from references in a combination is sufficient to avoid any *prima facie* case of obviousness.

Because the burden is clearly upon the Examiner to establish a *prima facie* case of obviousness, and in this instance the Examiner has failed to establish a

prima facie case of obviousness because three positively recited structures in Appellants' claims are missing in the combination of prior art references, the Examiner simply fails to meet his burden of establishing the first prong of a *prima facie* case of obviousness.

Because the Examiner here fails to support his allegation that the enumerated three structures (and corresponding method steps) are disclosed somewhere in the Kanoh/Devie/Almogy combination, the Examiner has failed to meet his burden of proof of establishing the first prong of a *prima facie* case of obviousness and any further rejection of independent claims 1, 19 and 24 (or claims dependent thereon) is respectfully traversed.

E. Even if the Kanoh/Devie/Almogy combination disclosed Appellants' claimed structures, the Examiner fails to provide the required explicit "analysis" as to a rationale for picking and choosing elements from these different references and them combining them in the manner of Appellants' independent claims

In the *KSR* decision quoted more fully above, the U.S. Supreme Court held that "this **analysis should be made explicit**." (emphasis added) *Id.* at 1396. The Court went on to quote the Court of Appeals for the Federal Circuit's advice that "rejections on obviousness grounds **cannot be sustained by mere conclusory statements**" (emphasis added, *In re Kahn*, 78 USPQ2d 1329 (Fed. Cir. 2006)).

The Examiner fails to provide any reason or rationale as to why one of ordinary skill in the art would modify the Kanoh, Devie and Almogy combination

to reach the combination of elements and interrelationship between elements recited in Appellants' independent claims 1, 19 and 24.

Instead of meeting his burden of identifying evidence supporting the second prong of an obviousness rejection, the Examiner merely states that it would "have been obvious to one of ordinary skill in the art at the time the invention was made to modify Devie with a diffraction grating in order to provide the advantage of added versatility due to an additional optical component which can be used to provide beamsplitting capabilities." This is the epitome of a conclusory statement and is insufficient to support an obviousness rejection. As the Supreme Court noted above, mere conclusory statements are "insufficient to support a *prima facie* case of obviousness."

In view of the above, the Examiner, in providing only conclusory statements, fails to identify any reason or rationale as to why one of ordinary skill in the art would modify the Kanoh, Devie and Almogy references to reach Appellants' claimed combinations. Accordingly, even if the prior art references disclosed all of Appellants' claimed structures (and method steps)(and this is respectfully traversed as noted above), without the Examiner's explicit "analysis," he does not meet his burden of establishing the second prong of a *prima facie* case of obviousness.

Accordingly, the rejection of independent claims 1, 19 and 24 (and claims dependent thereon) is not supported in the Final Rejection and any further rejection thereunder is respectfully traversed.

F. The Examiner fails to appreciate that each of the three references would independently lead one of ordinary skill in the art away from Applicants' claimed combination and therefore rebuts any *prima facie* case of obviousness (even if one had been made)

As noted above in the *Gurley* case, if the prior art references preclude or teach away from the claimed combination of elements, they legally rebut any *prima facie* case of obviousness.

While Appellants have noted that the Examiner has not set out a *prima facie* case of obviousness because all claimed structures (and method steps) are not taught in the combination of references (the first prong) and additionally because the Examiner has not met his burden of providing an explicit "analysis" as to why and how portions of those references would be combined (the second prong), the Examiner also appears to ignore the fact that each of the three references precludes the claimed combination and therefore would lead one of ordinary skill in the art away from Appellants' claimed combination.

As noted above, the Kanoh reference discloses overlapping interfering beams which, by definition, precludes "laterally displaced spots" required by Appellants' beamsplitter beams and "detector means."

Devie discloses no splitting of a beam into "two or more beams" and instead supplies one beam from separate point sources (either 40 or 52) and directs each beam to a single detector (50 or 56). Following the Devie teaching would preclude Appellants' claimed embodiment of the "beamsplitting means" for splitting a beam into two or more beams and for directing those beams to laterally displaced locations on one detector. Accordingly, Devie's teaching would preclude Appellants' claimed combination of elements.

Similarly, Almogy teaches that a single beam is split by a diffraction grating into three displaced beams which utilize three separate detectors. The use of three separate detectors would preclude Appellants' claimed detector means which has been split into "two or more beams" and then applies them to the single detector.

Because each of the cited prior art references would lead one of ordinary skill in the art away from Appellants' claimed invention, these adverse teachings rebut any *prima facie* case of obviousness made.

VIII. CONCLUSION

The above discloses in detail how and why "wavefront shaping means," the "beamsplitting means" and the "detector means" as defined in Appellants' specification are not shown in the Kanoh/Devie/Almogy combination of references. Without disclosure of these three claimed elements in the

combination, there is no evidence supporting the first prong of a *prima facie* case of obviousness. Appellants have also noted that the Examiner has failed to meet his burden of providing the required explicit "analysis" of his rationale for combining elements which is the second prong required for a *prima facie* case of obviousness. Finally, Appellants have noted that each one of the three cited references precludes Appellants' claimed combination of elements and therefore rebuts any *prima facie* case of obviousness (even if such a case had been made out).

As a result of the above, there is simply no support for the rejections of Applicants' independent claim or claims dependent thereon under 35 USC §103. Thus, and in view of the above, the rejection of claims 1-3, 5-16, 19-21 and 24 under 35 USC §103 is clearly in error and reversal thereof by this Honorable Board is respectfully requested.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____

Stanley C. Spooner
Reg. No. 27,393

SCS:kmm
Enclosure

IX. CLAIMS APPENDIX

1. Apparatus for indicating the departure of a shape of an object from a specified shape, the apparatus comprising:

radiation means for directing an incident beam of radiation onto the object,

inspecting means for inspecting a final beam, said object located optically between said radiation means and said inspecting means

at least one wavefront shaping means, optically disposed between the radiation means and the inspecting means for shaping the final beam to have a substantially planar wavefront when said object has said specified shape, and said final beam comprises a beam which has been both transmitted by or reflected from said object and shaped by said wavefront shaping means, said at least one wavefront shaping means is arranged to compensate for non-planarity introduced by said object having said specified shape, and said inspecting means is arranged to determine any departure of the wavefront of the final beam from planarity, wherein said inspecting means comprises:

beamsplitting means for splitting the final beam into two or more beams and for directing said two or more beams to laterally displaced locations; and

detector means for detecting radiation intensity of said two or more beams on the detector means.

2. Apparatus according to claim 1 wherein said radiation means is arranged to produce a collimated beam of radiation.

3. Apparatus according to claim 1 wherein said incident beam of radiation is optical radiation.

5. Apparatus according to claim 1 wherein at least one said wavefront shaping means is located between the radiation means and the object.

6. Apparatus according to claim 1 wherein at least one said wavefront shaping means is located between the object and the inspecting means.

7. Apparatus according to claim 1 wherein at least one said wavefront shaping means comprises a lens or curved reflector.

8. Apparatus according to claim 1 wherein at least one said wavefront shaping means comprises a diffraction grating or hologram.

9. Apparatus according to claim 1 wherein at least one said wavefront shaping means is provided by a spatial light modulator.

10. Apparatus according to claim 1 including means for adjusting the relative position of the object and a said wavefront shaping means.

11. Apparatus according to claim 1 comprising a beam splitter between said radiation means and said inspecting means.

12. Apparatus according to claim 1 wherein the beamsplitting means of said inspecting means comprises at least one of a diffraction grating and hologram.

13. Apparatus according to claim 1 wherein the beamsplitting means of said inspecting means comprises non-diffractive beamsplitter means for receiving light from two spaced object planes along a common path for transmission to first and second image areas along respective first and second optical paths, and focussing means arranged to bring said first and second object planes into focus in said first and second areas.

14. Apparatus according to claim 1 wherein the inspecting means is arranged to provide an analysis of the shape, or components of the shape, of the wavefront of the final beam.

15. Apparatus according to claim 1 wherein the detector means of the inspecting means comprises a pixelated imaging photosensor.

16. Apparatus according to claim 15 wherein the pixelated imaging photosensor is a charge coupled device (CCD) array.

19. A method of indicating the departure of a shape of an object from a specified shape, the method including the steps of:

directing an incident beam of radiation onto the object;

shaping at least one of said incident beam and a beam transmitted by or reflected from said object to have a planar wavefront if the object has said specified shape, a final beam comprising a beam which has been both transmitted by or reflected from said object and shaped by said shaping step; and

inspecting the final beam for any departure of its wavefront from planarity, wherein the step of inspecting said final beam comprises the steps of:

splitting the final beam into two or more beams; and

directing said two or more beams to laterally displaced locations on a detector.

20. A method according to claim 19 wherein said object is an optical component.

21. A method according to claim 20 wherein said optical component is a window or is of generally laminar form, or comprises a planar reflective surface.

24. Apparatus for indicating the departure of a shape of an object from a specified shape, the apparatus comprising:

a radiation source for directing an incident beam of radiation onto the object;

a beam inspecting device for inspecting a final beam, wherein said final beam comprises a beam which has been both transmitted by or reflected from said object and shaped by at least one wavefront shaping device, said object located optically between said radiation source and said inspecting device;

said at least one wavefront shaping device, optically disposed between the radiation source and the inspecting device, for shaping the final beam to have a substantially planar wavefront when said object has said specified shape, said at least one wavefront shaping device is arranged to compensate for non-planarity introduced by said object having said specified shape, and said inspecting device is arranged to determine any departure of the wavefront of the final beam from planarity, wherein said inspecting device comprises:

a diffraction device for splitting the final beam into two or more beams and for directing said two or more beams to laterally displaced locations; and

a photosensor for detecting radiation intensity of said two or more beams at said laterally displaced locations.

X. EVIDENCE APPENDIX

None.

XI. RELATED PROCEEDINGS APPENDIX

None.